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EUGENICS LECTURE SERIES. XIV

THE RIGHT OF THE UNBORN CHILD

BEING A LECTURE DELIVERED
ON NOVEMBER 13, 1926
TO
TEACHERS FROM THE
LONDON COUNTY COUNCIL SCHOOLS
BY
KARL PEARSON, F.R.S.

WITH THREE PLATES, FIVE FOLDING PEDIGREES
AND TWELVE DIAGRAMS IN TEXT

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The chief foe to any moral renascence lies not in a minority swayed towards vicious practices by selfish instincts, but rather in the *vis inertiae* of a slumbrous public. *Anon.*

THE RIGHT OF THE UNBORN CHILD

I think I may assume that you all know the School Medical Officer and his functions. Probably some of you think him a nuisance because he interrupts classwork. Others may bless him because he assists in removing the mentally deficient to special schools, and by aid of the Ophthalmic Clinic may enable some of your pupils to follow your black-board work more closely.

Now let us look into some element of his work and take that for a starting point. For example, you know he puts up letters of various sizes, ascertains which the children can read at given distances, and so determines in a somewhat rough manner their acuity of vision. Visual acuity is measured by the size of type—so-called Snellen's type—which can be read at 6 metres distance. When a child can read Snellen's "Type 6" at 6 metres his vision is said to be normal. If he can read Type 4, his vision is supernormal, if only Type 9, his vision is subnormal. These various grades of vision are represented by 6/6, 6/4, 6/9, etc., the denominator giving the type which can be read at the numerator distance. When the School Medical Officer finds a child who cannot read Type 12 at a distance of 6 metres, he suspects eye trouble, the child goes to an Eye Clinic and probably comes back with a pair of spectacles. There the matter will probably end—or occasionally, possibly, in a broken pair of glasses, as boys, even more than girls, dislike wearing spectacles.

I wonder how many of you have ever thought further on that point, and seen its relation to the great drama of Evolution, and to the transcendent difficulty of maintaining the fitness of civilised nations? You may smile at such a big problem connected with such an everyday experience, but believe me, it is the everyday experiences which, if you rightly grasp them, lead you on to the biggest problems in human life, and life's relation to the world in which it is placed.

Let us follow up what that case of low visual acuity really means. It means, of course, that the eye is a poor instrument of sight, but it is a poor instrument because of some failure, some defect, in its physical structure. Now the eye is essentially a very complicated structure, and may fail to be efficient for many causes. Its various refracting surfaces

should be truly spherical. Their sizes must be such that an image is formed exactly on the retina, neither before nor behind it. It must have powers of accommodation which allow it to see objects at different distances. All these things, and others too, are needful for efficient sight. Let us take the first surface we reach on approaching the eye, the outer surface or cornea. For perfect sight it must be truly spherical. Probably, if our measurements were fine enough, the cornea of few persons would be found truly spherical, but they are practically spherical in some 85 % to 90 % of cases, i.e. are not distorted enough to produce very bad vision*. Now we are able to measure the radii of the eye in different meridians, and the largest and smallest of these radii are usually in planes almost at right angles, the difference of the curvatures in these planes, the so-called principal planes of the eye, is used as the basis of our measure of what is termed Corneal Astigmatism. In everyday language, you may take it that Corneal Astigmatism is a measure of the departure of the external surface of the eye from a truly spherical form.

Now let us inquire how Corneal Astigmatism affects Visual Acuity. I put before you a table showing you how Corneal Astigmatism is related to Visual Acuity in nearly 1000 boys from one London school. At the top you have a scale of Corneal Astigmatism, i.e. a measure of

Visual Acuity and Distortion of Cornea.

Corneal Astigmatism in Dioptres.

Visual Acuity, Snellen's Scale.		Working Scale.		- 2'25	- 1'5	- 0'75	0'0	0'75	1'5	2'25	3'0	3'75	4'5	5'25	6'0	Totals
6/4		1'50	—	—	—	2	1	—	—	—	—	—	—	—	—	3
		1'40	—	—	1	6	10	—	—	—	—	—	—	—	—	17
6/5		1'29	—	—	—	64	20	—	—	—	—	—	—	—	—	84
6/6		1'11	—	1	1	119	64	9	2	—	—	—	—	—	—	196
		.91	—	—	5	93	133	7	2	—	—	—	—	—	—	240
6/9		.75	—	1	3	50	43	15	3	1	—	—	—	—	—	116
6/12		.58	1	1	3	32	45	11	11	2	2	1	—	—	—	109
6/24		.37	—	3	2	22	21	19	14	9	2	—	1	—	—	93
		.25	—	—	1	8	18	5	9	6	2	—	—	—	—	49
6/60		.14	—	1	0'5	17	13'5	3	4	1	2	2	1	1	—	46
		.08	—	—	—	8	6	2	2	—	—	—	—	—	—	18
		.04	—	—	1	3	6	3	3	—	—	—	—	—	—	16
Totals			1	7	17'5	424	380'5	74	50	19	8	3	2	1		987

* A model of a spherical "eye," capable of being distorted, was exhibited at the lecture.

the want of sphericity in the outer surface of the eye. Of course Visual Acuity depends, as I have said, on many factors, but this is one of them. Look at any of the numbers here; for example, 9 boys with a lack of sphericity measured by 2.25 have a visual acuity measured by .25. They would certainly fail to see the blackboard effectively. You will say: What does it matter? Send them to the Eye Clinic and their defective vision will be corrected. I ask you to turn your minds further back, some 25,000 years perhaps, to the end of the palaeolithic age. What were the ancestors of those boys like? I say that they could not possibly have had a vision of .25 or $\frac{6}{24}$ in Snellen's type. No palaeolithic man could have survived with that vision; he could not have seen his game nor stalked and killed it. He could not have seen his foes in time and escaped them. The palaeolithic hunter, if still the lord of the earth, was then far more equally matched by other types of life. His survival depended on his vigilance, and that vigilance very largely depended on keenness of vision. I do not think we shall take any too high an estimate if we assert that, when the palaeolithic man's vision was below $\frac{6}{15}$, he would have found it very hard, probably impossible, to survive. Now how many of these boys have vision below this value? 222 boys, or 22.5 % of the boys of this school. Thus 22.5 % of this

Visual Acuity and Distortion of Cornea.

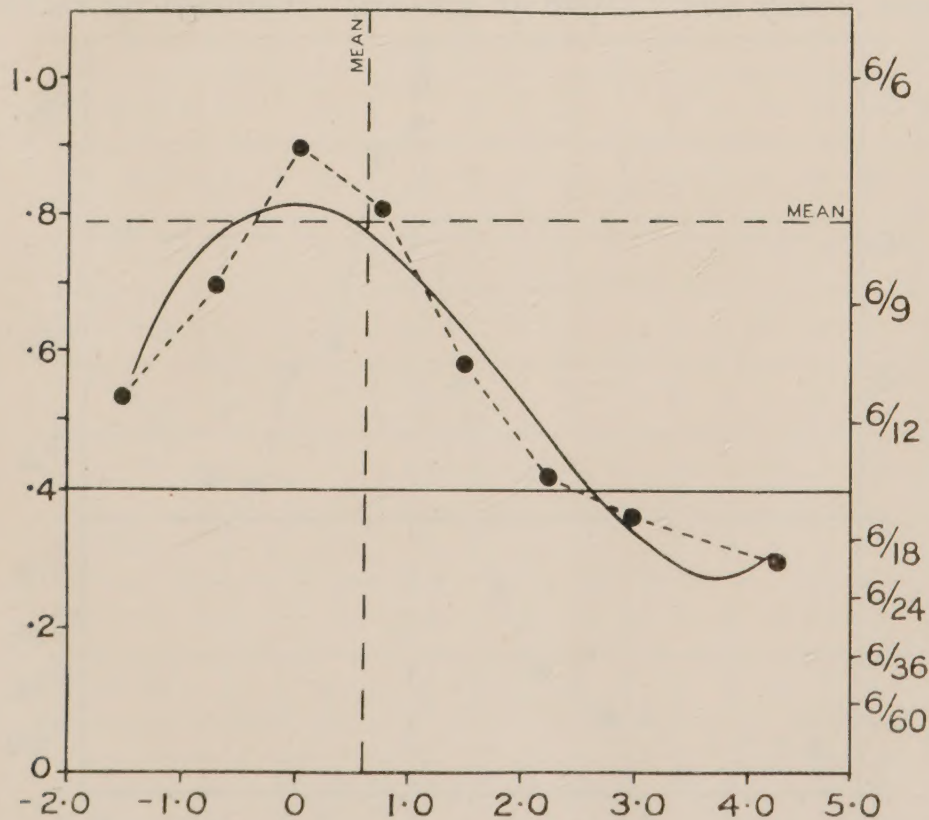


Diagram I.

modern population would in all probability have perished in palaeolithic times. The mammoth hunter had no spectacles, and even as late as 1916 a vision of $\frac{6}{18}$ would have disqualified a man for work in the trenches. Even to-day a man must have $\frac{6}{8}$ sight in both eyes to enter the Navy, and for a commission in the Army $\frac{6}{8}$ in one eye and not less than $\frac{6}{12}$, i.e. .5, in the other.

Diagram I (p. 5) shows you how rapidly Visual Acuity falls off, when the outer surface of the eye fails to be truly spherical, either by the vertical diameter being greater than the horizontal, astigmatism with the rule, or being less than the horizontal, astigmatism against the rule. These are denoted by the plus and minus signs respectively on the dioptric scale. That diagram indicates clearly how Natural Selection working through Visual Acuity made the eye surface truly spherical.

We cannot pass in review all the factors that can mar vision, but we may look at one further factor. General Refraction is a measure of whether the lenses of the eye form the image of an object in front of, on, or behind the retina. Here is a table (p. 7) of 880 boys from the same school. If you do not know, you need not trouble to grasp the scale at the top, it represents the power of the glass needful to bring the image on to the retina, the short-sighted being to the right and the long-sighted to the left of the scale.

Visual Acuity and "Depth of Eye-ball" (General Refraction).

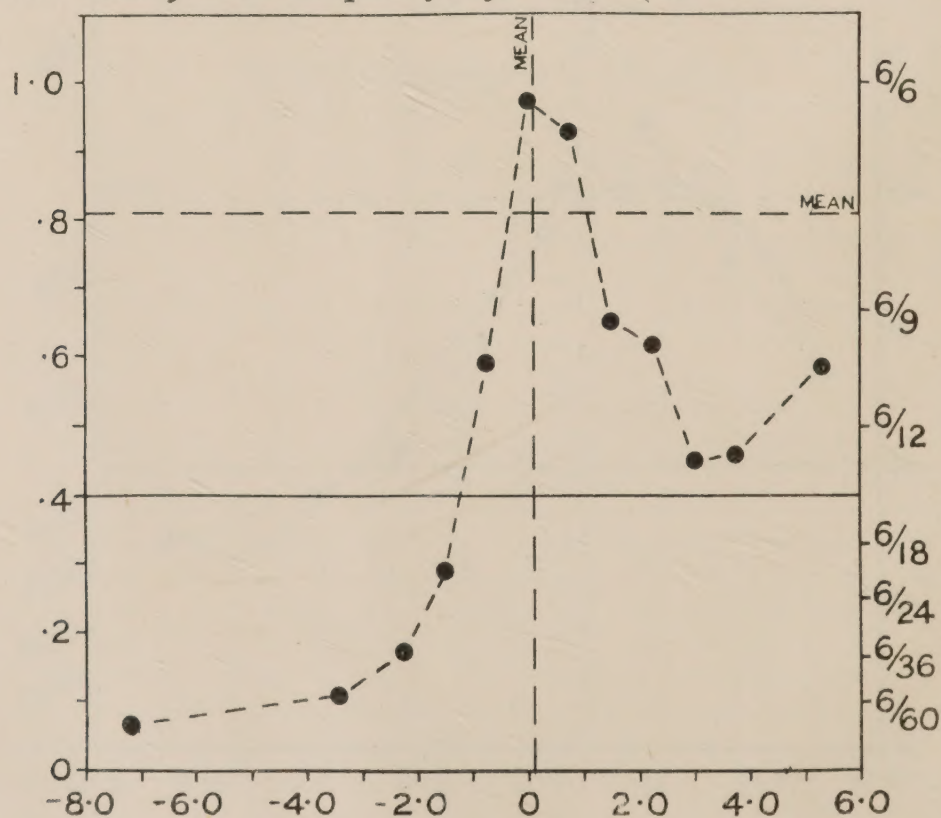


Diagram II.

Visual Acuity and "Depth of Eye-ball" (General Refraction).

Refraction in Dioptres.

	-1.5.75	...	-12.75	...	-6.75	-6.0	-5.25	-4.5	-3.75	-3.0	-2.25	-1.5	-0.75	0.0	0.75	1.5	2.25	3.0	3.75	4.5	5.25	6.0	6.75	Totals
1.50	—	...	—	...	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	3
1.40	—	...	—	...	—	—	—	—	—	—	—	—	—	4	11	2	—	—	—	—	—	—	—	17
1.29	—	...	—	...	—	—	—	—	—	—	—	—	—	55	17	—	1	—	—	—	—	—	—	73
1.11	—	...	—	...	—	—	—	—	—	—	—	—	4	141	33	1	2	—	—	—	1	—	—	182
.91	—	...	—	...	—	—	—	—	—	—	—	—	11.5	135.5	66	7	6	2	2	—	—	—	—	231
.75	—	...	—	...	—	—	—	—	—	—	—	0.5	16.5	61	20	2	4	—	2	1	—	—	—	107
.58	—	...	—	...	—	—	—	—	—	—	—	4	20	32	20	2	7.5	2.5	3	—	—	—	—	94
.37	—	...	—	...	—	—	—	—	—	—	2	10.5	22	5	10.5	5	8.5	2	3	1.5	1	—	—	72
.25	—	...	—	...	—	—	—	—	2	—	6	10	4	1	2.5	2	1	2	4.5	—	—	—	—	35
.14	—	...	—	...	—	—	—	—	2	1	12.5	7.5	4	1	—	3	2.5	1	2	0.5	—	—	—	38
.08	—	...	—	...	—	—	—	—	3	3	2	1	—	—	—	—	—	1	—	—	—	—	—	15
.04	1	...	1	...	2	—	2	—	1	2	2	2	—	—	—	—	—	—	—	—	—	—	—	13
Totals	1	...	1	...	3	1	6	—	8	6	24.5	35.5	82	435.5	183	24	32.5	10.5	16.5	3	4	2	1	880

Visual Acuity, Snellen's Scale.

6/4

6/5

6/6

6/9

6/12

6/24

6/60

Diagram II (p. 6) indicates how acuity of vision declines as the image is formed in front of or behind the retina at increasing distances; the diagram is not truly symmetrical, but it is not so far from symmetrical. What we were dealing with in the first illustration was the distortion of the eye-ball, what we are dealing with now is the distance of the retina from that surface, roughly the "depth" of the eye-ball. Unless this depth lies within very narrow limits the Visual Acuity will be defective.

Turn again to our table of boys (p. 7) and cut it off at a vision of $\cdot 4$, i.e. $\frac{6}{15}$ in Snellen's scale. We see that 173, i.e. 19.7%, of these boys have sight which would have made it highly improbable that they could have survived as prehistoric men. If you cut off that 19.7% of boys you will remove all the myopia—all the short sight—of any importance in the population. Probably many of these 19.7% fall into the previous group of 22.2% who would be cut off owing to their astigmatism. Now I want you to grasp how extraordinarily powerful is the force of Natural Selection. Let us assume in this case that a person who could not see ordinary writing on a blackboard at 6 yards or so, would not 25,000 years ago have had keenness of vision adequate to protect himself from enemies or to kill his prey. What happens, then, when you submit a population like our school boys to such a stringent selection? 19.7% to 22.2% would fail in the examination, Nature being about as stern as the University Matriculation examiners. The population before selection had a Visual Acuity measured by about $\cdot 80$, a Corneal Astigmatism of $\cdot 61$ and a General Refraction of $\cdot 11$. After selection the remainder have a Visual Acuity of $\cdot 95$, a Corneal Astigmatism of $\cdot 4510$ and a General Refraction of $+ \cdot 31$. This shows us that the effect of such Natural Selection would be to improve the Visual Acuity by about 15%, to lessen the Corneal Astigmatism, i.e. the distortion of the surface of the eye, by 25%, and to throw the population mean for General Refraction further towards long sight, i.e. to shorten the depth of the eye-ball.

Now let us take into account another point—the change of ocular characters with growth. Some characters of the eye change with growth, others hardly at all. The latter is notably the case for Corneal Astigmatism. The accompanying Diagram III shows how steady it is from age 9 to 14. Writers of ophthalmic textbooks state that this corneal astigmatism, this want of sphericity in the surface of the eye, is "congenital,"—born with a person, not an effect of environment. Now, if this be so, what produces this congenital defect? There is only one answer, this and with few exceptions nearly all congenital defects are the product of heredity. I can demonstrate this to you from the data of a Swiss

Degree of Corneal Astigmatism and Age.

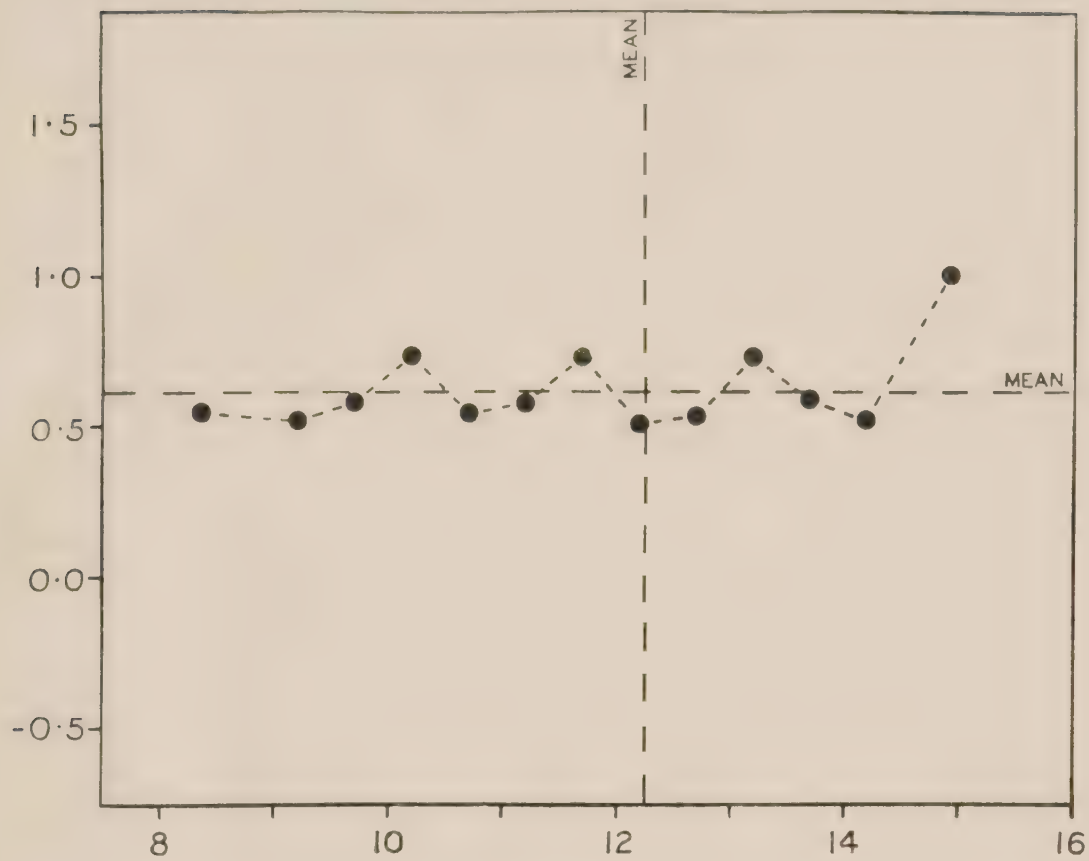


Diagram III.

Inheritance of Corneal Astigmatism in Mothers and Sons.

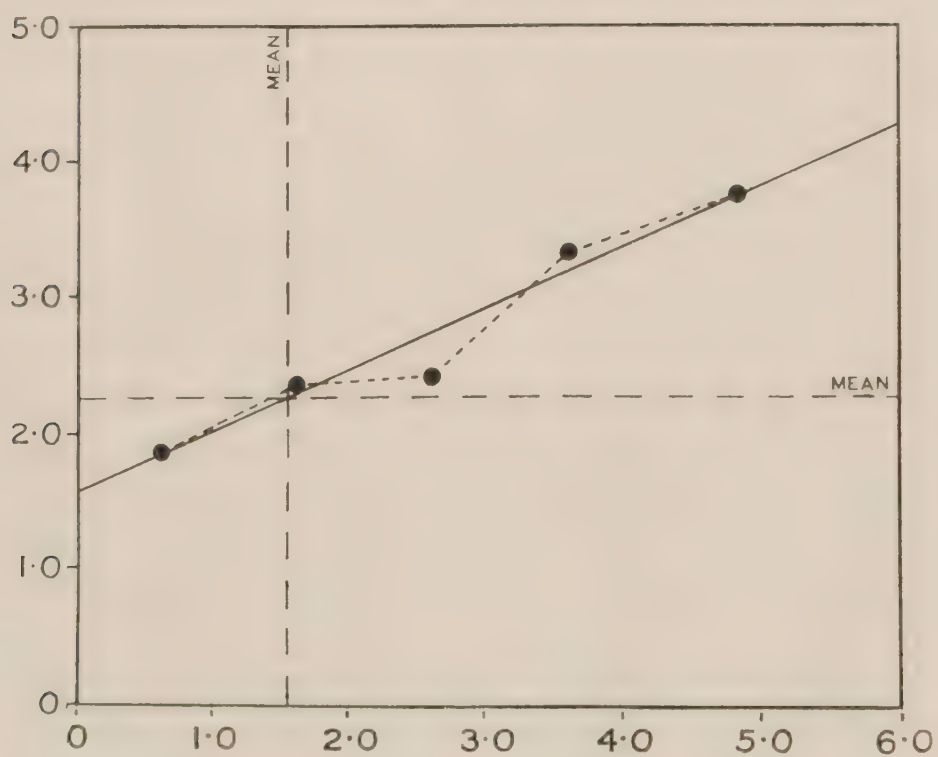


Diagram IV.

ophthalmologist, which I have arranged to show you (i) (Diagram IV) how the son's corneal astigmatism increases with that of the mother, and (ii) (Diagram V) how the corneal astigmatism of one sister increases with that of a second.

Inheritance of Corneal Astigmatism in Pairs of Sisters.

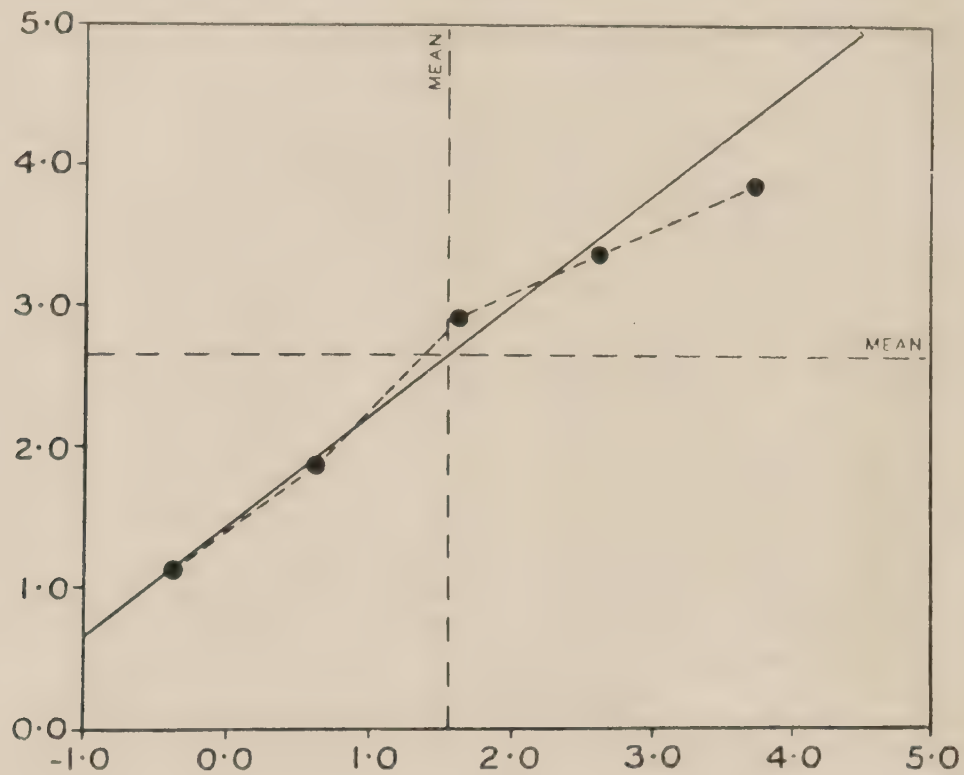


Diagram V.

Again, how are we to interpret this? Why, it signifies that when lack of good vision led to the elimination of those with eyes not nearly spherical, nor with the proper depth for their lens system, the remainder must have bred a race with more efficient eyes than those of the previous generation; thus you see Nature in progressive evolution, modelling the eye to greater efficiency. If you will only go to the bottom of any one of our human physical characters, you will trace the same modelling influence of Nature. A great statesman, speaking in 1894 at the Oxford Meeting of the British Association, asserted that no man had seen Natural Selection at work. Well, we know now and can measure the strength of heredity for almost any character; we know in many cases, such as the eye, what variation of its physical characters is permissible in order not to destroy efficiency. We know when efficient vision fails, as it does fail in many cases to-day, that without spectacles the unfortunate possessor of inefficient vision lacks a livelihood and has to be supported by the family or the state; this is true even at the present

time. Realise, then, the cave man whose subsistence depended not on agriculture but on hunting, and whose life depended on *awareness*, on speed of foot, on acuity of hearing and seeing, on physical strength and ingenuity of resource. We have much to thank Natural Selection for when, with the strength I have indicated, it eliminated the less fit and gave each one of us a better inheritance. Are we squandering our patrimony?

There remains the startling fact, true in another sense from what Lord Salisbury meant, that we do not now see Natural Selection at work. Civilisation has not entirely, but it has largely suspended its action in modern life, and we have neglected the acceptance of what a power it has been for the uplifting of man. We are failing to replace it in time by an equally potent control.

I have tried in the previous illustrations to indicate to you how all powerful a force Natural Selection has been in moulding towards efficiency such an organ as the eye. One of the most impressive facts of the past is the dominance of that force. One of the great dreads which must oppress every thinking mind which approaches our modern social problems lies in the partial suspension of this great power. Is civilised man bound to deteriorate physically and mentally owing to the suspension of this control? The world has seen in the very short period of its life that history covers a number of great civilisations, each of which has perished in turn. One of the peculiarities of written history is the inadequacy of the reasons given for the decline and fall of great civilisations. May it not be that knowledge of the causes of this fall will only come when we treat the history of the great masses of men which form nations and empires from the biological standpoint? When we measure how a race deteriorates if Natural Selection be suspended? Does every civilisation involve that suspension, and thereby sow the seeds of its own decay?

The fundamental idea in a civilisation involves the living together of men in a community, the creation of a social organisation. Human life, like animal life, starts with the struggle of the individual with his fellows and his environment, but gradually the individual struggle is replaced by the struggle of families, clans, tribes, loose tribal confederations, and ultimately nations and empires. The force behind this process is indeed fairly obvious, the combined effort of massed human beings can conquer the environment more easily and more effectively than individual labour can. Men become welded together in groups, and the family spirit, the clan, the racial and the national spirits grow up and dominate man's

individualism, his more selfish instincts and primitive appetites. That clan, tribe or nation is the strongest which is the most numerous, makes the best use of all its members and links them together by bonds of mutual aid and sympathy. The struggle for existence is transferred from the individual to the nation. Natural Selection becomes a selection of nations rather than of individuals. The struggle becomes one of nations for trade routes, for vacant corn lands, for oil and mineral wealth, under whatever fine words it may be cloaked. And the struggle is not necessarily for existence, but for easier conditions of life, in short "for a place in the sun." What, then, if the natural selection of the individual has ceased in these modern national groups? May it not be that the very growth of sympathy between members of the group may destroy the group itself? The tree may perish because its roots are no longer pruned. We value our modern civilisation based upon the nation as unit, but what if, in abolishing the pruning knife and the "hard cradle," nations are sowing the seeds of their own decay. Why is it that in history—and in pre-history also, I would add—we do not find the continuous development of one race to higher and higher stages of civilisation? What we do find is some new race, physically and mentally fit, full of *awareness*, coming from a "hard cradle," often an unknown cradle, because it was outside the then civilisation, pouring in and taking the place of the civilised race, and preserving just as much of its traditional culture as it found convenient or could grasp. The expense to human progress of this neglect in civilised communities to balance sound minds by sound bodies has been gigantic. Mankind goes slowly forward but its regressions are almost as large and as frequent as its progressions. Natural Selection, which forced mankind to breed only from its fittest, made for individual efficiency; civilisation sacrifices at the start individual progress for national progress, but ultimately the nation,—the civilisation,—perishes because there is no great controlling power like Natural Selection forcing the nation to breed only from its best. That is, I think, the ever-present fear which the scientific mind recognises: civilised man has largely destroyed crude Natural Selection, must this end by civilisation itself once more destroying civilised man?—In my own mind and in a growing number of other minds the opinion is strong that it must inevitably do so, unless civilisation can find a method of doing for itself what Natural Selection did for man during his ascent—insuring that he shall breed only from his best. The study of how it is possible forms the subject matter of what we now term the Science of Eugenics. We have to replace the ruthless action of Natural

Selection by reasoned conduct in civilised man. Only at this price can civilisation be progressive and not a source of individual deterioration. Let us look at this matter from two other angles, reviewing it not from the standpoint of an eternal right and an eternal wrong, nor from that of revealed religion, but solely as anthropologists. As anthropologists we see in the most primitive societies, an almost weird atmosphere of belief, fear and custom surrounding the three principal events of human life, birth, marriage and death. Many of the early tribal customs, especially those concerning birth and marriage, are now obscure, others we can trace to their origin in their tendency to strengthen the tribal feeling, to make the tribe strong in the opposing of its human competitors and in otherwise enabling it to face its environment. From this weird admixture of tribal belief, fear and custom arose two great factors of tribal and ultimately of national stability, namely the moral and religious senses. For the Roman the moral was that which was the *mos* or custom of his tribe; for the Roman *religion* was that which "religated" or bound the people together; great conceptions which emphasised the tribal strength. If you study the morality and religion of the ancient Jews, as described in the Mosaic books, you will find they fit exactly into the Roman ideas, and every primitive people provides us with the same lesson. Moral conduct is that which tends to strengthen the tribe or society of which we are members, and immoral conduct that which tends to weaken it. If you replace "moral" and "immoral" conduct by "social" and "anti-social" conduct, you will find a fairly safe guide to conduct for the rational human being. Beyond that you may be sure, anthropologically, that belief in transcendental rewards and punishments has grown up to enforce tribal custom on the weaker brethren. And, bear in mind, that this tribal morality and this tribal religion have largely developed round the three great incidents in human life; it is largely with these, though not, of course, entirely, that morality and religion in a given society concern themselves. The judgment on the same deed depends on the relation of the deed to the welfare of the tribe; it is moral to kill a member of a hostile tribe, but the deepest crime to kill a member of your own tribe. At all times and in all communities religion has taken under its special charge, marriage and birth*; it has ordained—doubtless on the basis of tribal experience—it may be rightly, it may be wrongly interpreted,—whom a man and woman may marry and whom they may not. It has taken cognizance of marriage,

* Nay, it is not improbable that treatment of the dead furnishes us with the earliest evidence for palaeolithic man having religious concepts.

and of birth, and of death, in order to maintain the tribal customs concerning them ; for on this group of *mores*, which form the tribal morality, the welfare of the tribe really did—or at least was supposed to—depend. Study Moses or, if you prefer, Martin Luther with this tribal conception of religion before you and you will grasp how no detail of married life was too intimate to be beyond the reach of their legislating and regulating zeals. Nay, even to understand the Reformation itself you must appreciate that it was the replacement of a universal church by separate national churches, and in no forced sense a real return to tribal gods, invoked to support and render victorious their individual nations. Nay, if you kept your eyes open during the recent world war, I think, you would have found many traces of religion as a tribal faith. This conception is strikingly expressed in the lines which Mr J. C. Squire wrote in 1915 or 1916:

God heard the embattled nations' charge and shout
 "Gott strafe England," and "God save the King,"
 God this, God that and God the other thing.
 "Good God!" said God, "I've got my task cut out."

Now I am not criticising this tribal origin of morality, nor this use of religion to strengthen a nation in times of stress. On the contrary I am convinced that if to save civilised nations from deterioration it is necessary to accept a new moral code with regard to parentage, that is for a nation to form new *mores* or customs, then a religious emphasis of this new code will not only be helpful, but as in all tribal history will *ipso facto* be developed. The knowledge of what is harmful to society and of what tends to its development and stability must be ascertained by the Science of Eugenics, but given a knowledge of the laws of social health as they depend on Nature and on nurture, then it is for an enlightened public opinion to insist on new morals and to support them with religious fervour. That is Eugenics from the practical side, its moral and religious aspect. As the founder of the Galton Laboratory declared almost in the last year of his life, "When the desired fulness of information shall have been acquired, then and not till then, will be the fit moment to proclaim a 'Jehad' or Holy War [that is, a religious war] against customs and prejudices that impair the moral qualities of our race."

Sir Francis Galton clearly grasped that the safety of the national life depended on breeding its future citizens from the physically and mentally fitter members. He realised that the old custom which permits parentage to men and women indiscriminately and without regard to

their fitness must be replaced by a new *mos*, in which it was an offence against man and God to bring the defective into existence, and that an adequate knowledge of our family history and of the laws of heredity enables us to state what under this new *mos* is and what is not immoral, i.e. against the general social welfare. No one, except possibly an abnormal Byron, thinks it a hardship that he may not mate with his sister, the tribal custom has made it distasteful, but many a man would think it a hardship, if he were told that it was antisocial to mate with a beautiful but mentally defective woman. Many a woman—with a perverted motherly instinct—would think it wicked to be told that it was immoral to mate with a congenital cripple or with a man sprung of insane stock. But these things under the new *mos* must become as abhorrent as incest is under the old *mos*. We know nowadays nothing like all, but we do know so much about heredity, that we have no excuse for producing afflicted children or children that are certain to transmit affliction in quite definite percentages. We prosecute parents for cruelty to their children, but what is greater cruelty than bringing children into the world of whom we can predict on the average that a certain number will suffer from incurable disease, and that others without being afflicted will transmit that disease to the next generation?

I do not wish to oppress you with horrors, but my belief is that nine-tenths of our population do not know what goes on in the other tenth. If they did, our morality as to parentage would very speedily be remoulded. I shall therefore be bold enough to put one or two cases before you. Here (Plate I) are a woman and her children suffering from a deformity of hand and foot, which largely incapacitates the sufferer from earning a livelihood, besides being repellent in the extreme. This woman tramped the country and has been twice, I think, certainly once, prosecuted for cruelty to her children. So far the current *mos* extends, but no one has thought of prosecuting her for having such children at all, that is beyond what the current morality is able to approve. She has had no difficulty in finding a mate with whom to propagate her kind. Yet the offence from the national standpoint involved in the creation of such children is far greater to my mind than even maltreating them. According to the custom and religion of many African tribes, that woman and her children would have been outcasts from the community. "God," writes Martin Luther, "creates children and he will provide for them." I venture to hold that such an idea belongs to a religion which does not fit the moral needs of our nation to-day. It is, we know, man and not the Deity, who creates children, and man is responsible for their *quality* as well as their quantity.

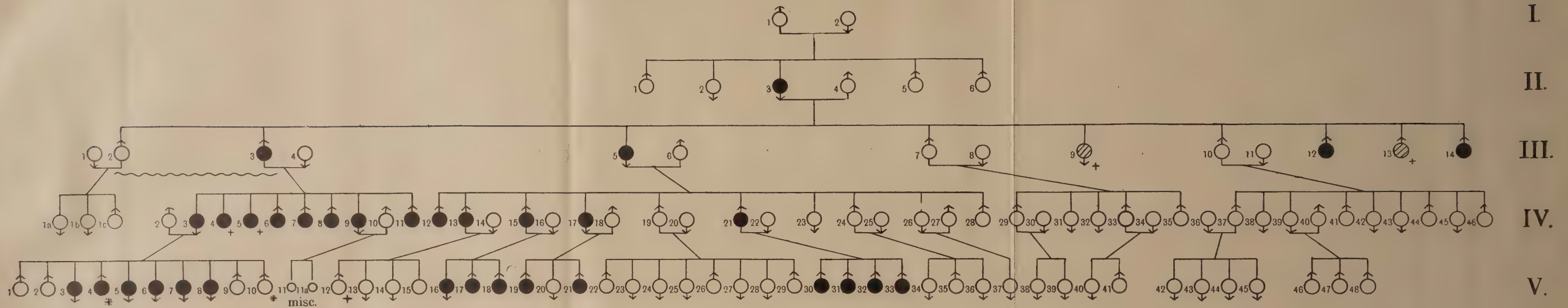
But let me pursue this matter further. Here is the pedigree (Pedigree I) of this "Lobster Claw" woman. You see that the whole 32 cases are due to one woman, the grandmother of my tramp, and this one woman has produced 32 cases of deformity like unto herself*. There was no morality in the community which said her "Nay," and all of her 15 great-grand-children are still at liberty to produce, like their great-grandmother, 32 more abnormalities in their turn. Public opinion in the country is at present not strong enough to face that greatest of all problems: "Is the making of the future nation to be left to the caprice of present individuals? Nature herself took care of it in the past; who is to take care of it in the future? We want some great champion of the unborn child—as the late Lord Shaftesbury was a champion of the born child. As the new generation is not responsible for its own existence, it needs the more a champion, whose clarion cry shall be: "The child has a right to be well-born."

But let us pass to another illustration. There is a very terrible disease, not unknown in high places in this land, which is termed *Haemophilia*. Briefly, the unfortunate sufferer is liable on receiving the slightest wound—a bruise, a fall or the extraction of a tooth—to bleed to death. It is a disease of males only, but females, who do not suffer from it, transmit it to their sons. It may pass through several generations of women, or a man may transmit it through his daughters to his grandsons. The mortality among the affected males is appalling; they go about with their lives, so to speak, in their hands. Here is a pedigree (Upper pedigree, p. 17) of a small family of bleeders or haemophiliacs. Of the 14 males who were sufferers only two reached adult life. IV. 12 was never able to follow any calling and bled to death at the age of 30. V. 2 has survived to be 23; his elder brother died of cerebral haemorrhage when a few years old; his younger brother had to have a milk tooth extracted; the extraction was postponed till he was ten, then at last he had to go to a dentist, the tooth was extracted and he bled to death. Now what of this young man of 23? I will cite a few words from a letter I received recently from him: "I am at present engaged to be married to a strong healthy girl and we are very eager to know all that we can about the inheritability of this disease." Neither of these young people seems to have considered that both had moral responsibility to their unborn children and to their nation before they got engaged. Is that "strong healthy girl" to be the mother of many generations of haemophiliac sons and haemophilia-carrying daughters?

The great American people has developed a *mos* which excludes the halt and maimed from crossing its boundaries; it has not yet acquired

* Plates I-III illustrate various members of this family.

PEDIGREE OF THE S FAMILY WITH HEREDITARY "LOBSTER CLAW."

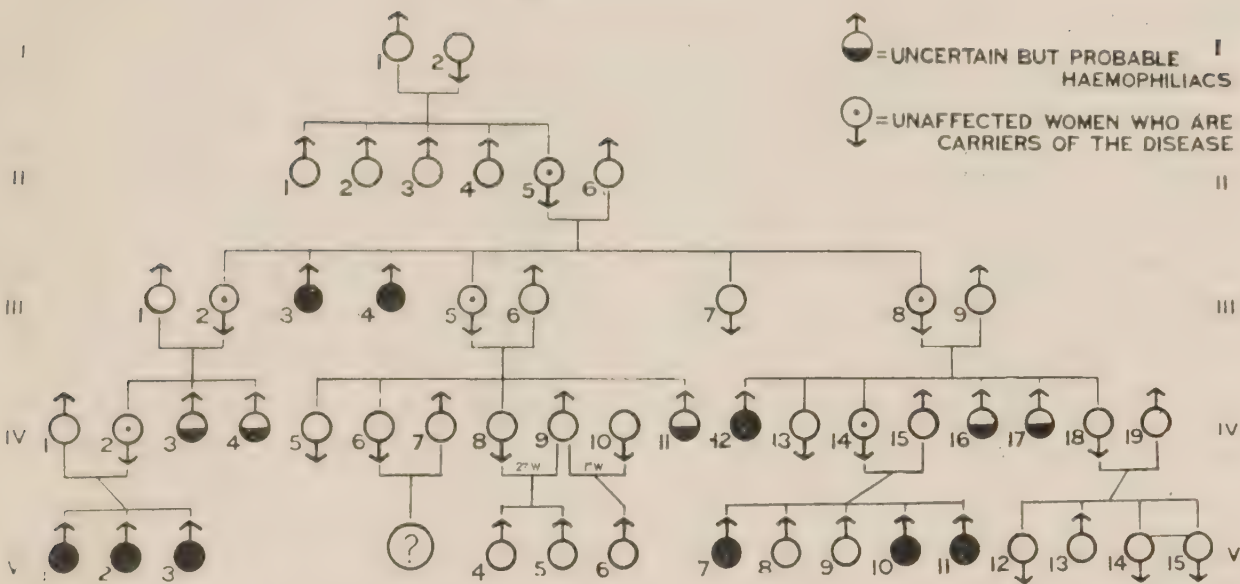


= Still-born.

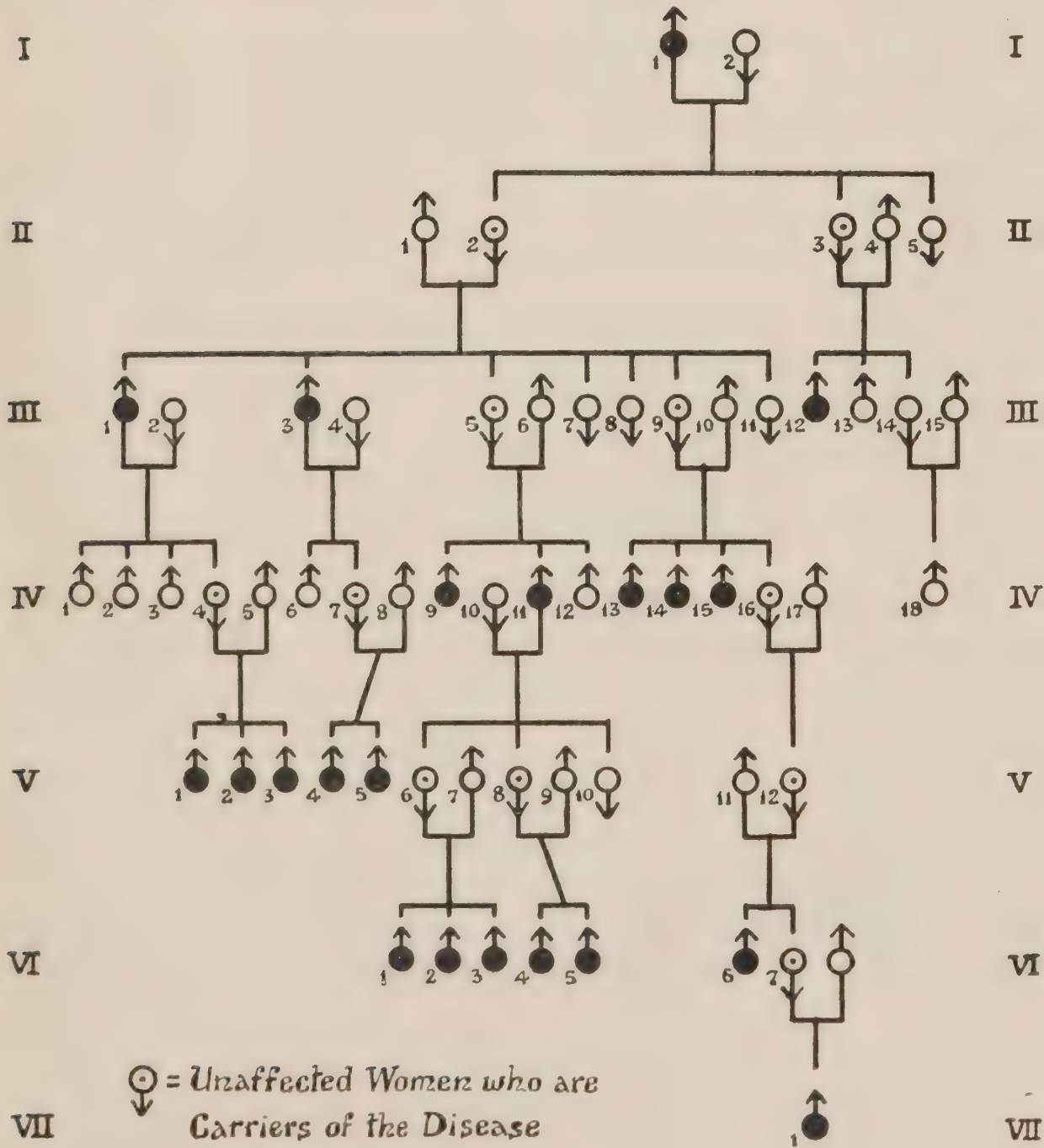
+ = Died young.

After this pedigree was engraved the Rector of N. wrote to K. Pearson stating that he had found at last the entry of *W. S.* (III. 2) in the baptismal register, two years later than that of *J. S.* (III. 3), so that doubt as to the order of birth of these brothers, expressed by the wavy line in the above diagram, has now been removed.

Haemophilia.



HAEMOPHILIA. HAY'S PEDIGREE



quite as important a *mos* which would prevent them from being bred within its boundaries !

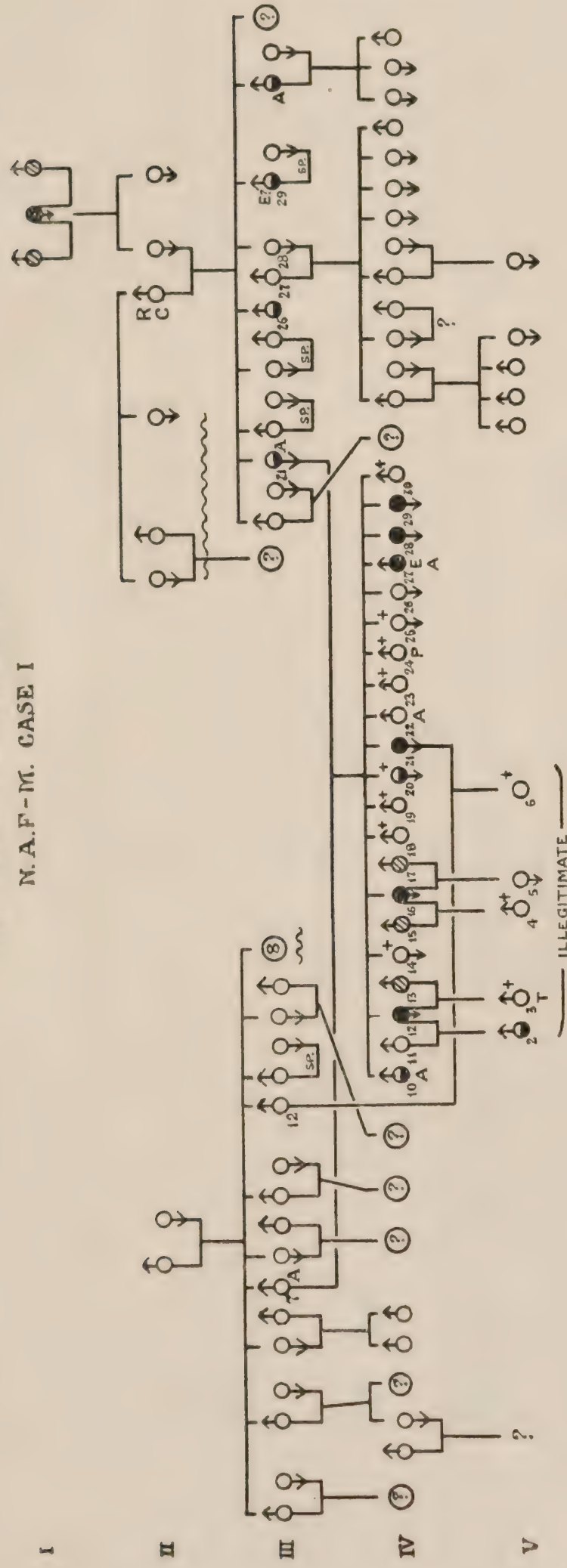
Now I give you another—also an American pedigree—to indicate what a single bleeder may achieve in spreading his disease. The pedigree (Lower pedigree, p. 17) shows a single bleeder giving rise to 20 haemophiliacs. It is very noteworthy because it impresses upon us a new aspect of morality. In the *mos* of the future it will not only be the *affected* individual who must be restrained from parentage ; here is a woman, VI. 7, who, if you take only her direct ancestry, shows no affected ancestor for four generations. Probably all these persons were healthy and she herself healthy, yet her mother, her grandmother, her great-grandmother, and her great-great-grandmother as well as herself were all, if healthy, carriers of the disease and all in turn could and did communicate it to their sons. The morality of the future will not only concern the actively diseased, but the healthy who carry disease latent in their germ cells. From the standpoint of the higher morals there is small difference between the affected men and the carrier women in this pedigree.

I could place before you many pedigrees of defect and disease in which a single man or woman has been guilty of bringing into existence 20, 30, 40 or more diseased and defective persons. I will only illustrate this twice more from other sides—that of the inheritance of mental deficiency and of blindness. I place before you a pedigree of Mental Defect prepared in this Laboratory. You will see in Generation I—the first we could trace—a mentally defective woman who, mating with unknown men, had two daughters, not *known* to be mentally defective. One of these married a physically defective man and had more than eight children. Of these three sons and one daughter were half-witted ; one son was epileptic, one daughter and another son alcoholic. This half-witted alcoholic daughter married an alcoholic husband and has had seventeen children by him. Of these :

No. 1 is half-witted and alcoholic ; No. 2 is mentally defective and had illegitimate offspring by different men ; No. 3 died in infancy ; No. 4 is mentally defective and had illegitimate offspring by different men ; Nos. 5 and 6 died in infancy ; No. 7 is half-witted ; No. 8 is mentally defective and the mistress of her paternal uncle ; No. 9 is a confirmed drunkard ; Nos. 10, 11, 12 died in infancy ; No. 13 is alive and appears to be normal ; No. 14 is mentally defective, alcoholic and epileptic ; Nos. 15 and 16 are both mentally defective and one is, in addition, epileptic ; No. 17, the last born, died in infancy. The births of children and grandchildren of this half-witted alcoholic woman have nearly all taken place in

MENTAL DEFICIENCY

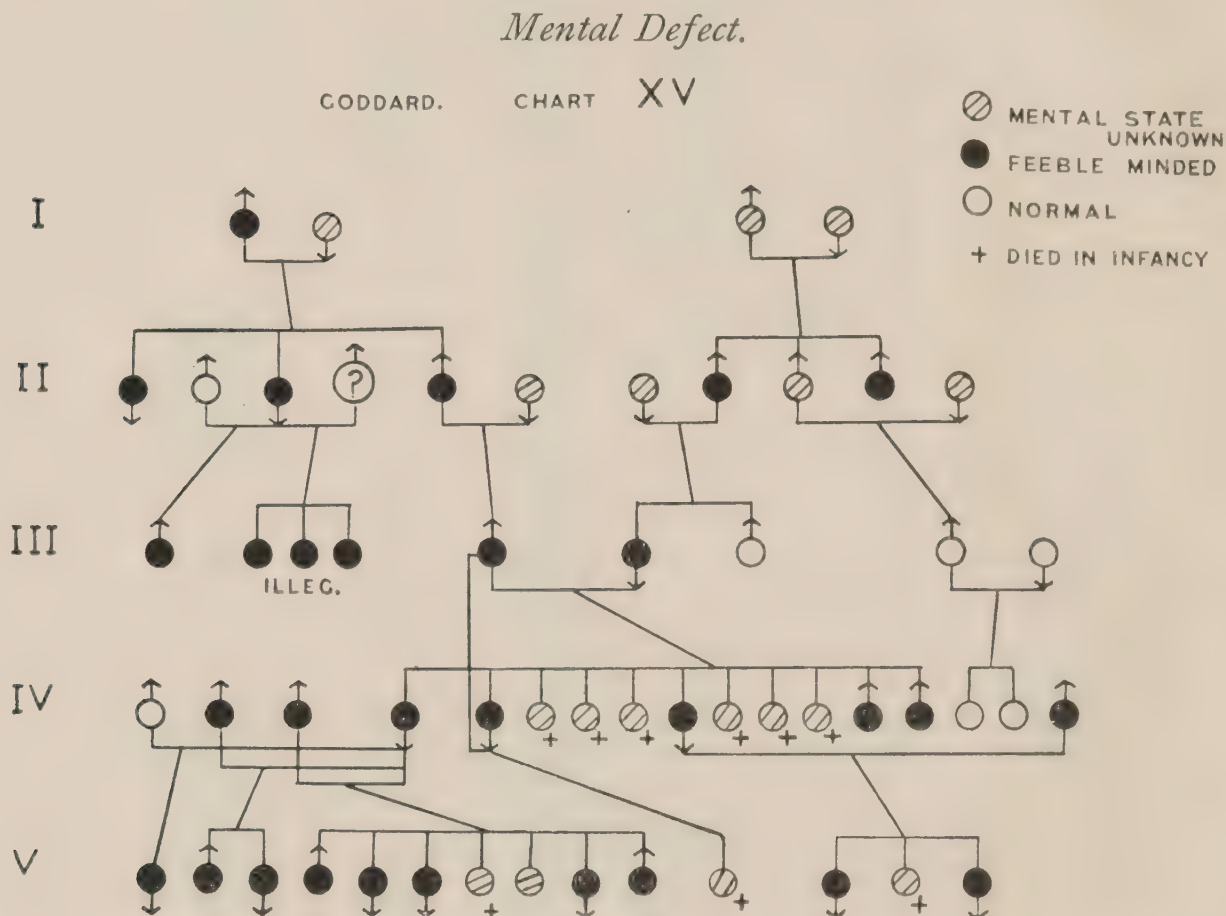
N. A. F.-M. CASE I



- Wholly Mentally Deficient
- ◐ Very Low Mental Level
- ◑ Nothing Known
- A Alcoholic
- C Cancer
- E Epileptic
- P Polydactyle
- R Rheumatic
- T Tuberculosis
- + Died Young

the workhouse, and no social regulation has stopped her giving worthless citizens to the nation.

Look again at the chart by Goddard below. We have here in the centre the marriage of a mentally defective man and woman; both came of mentally defective stocks—both fathers, one grandfather, uncle, aunts and cousins were mentally defective. Any student of heredity could tell you that such a marriage would be a crime. They have eleven children of whom six die as infants; thus you see Natural Selection is partially

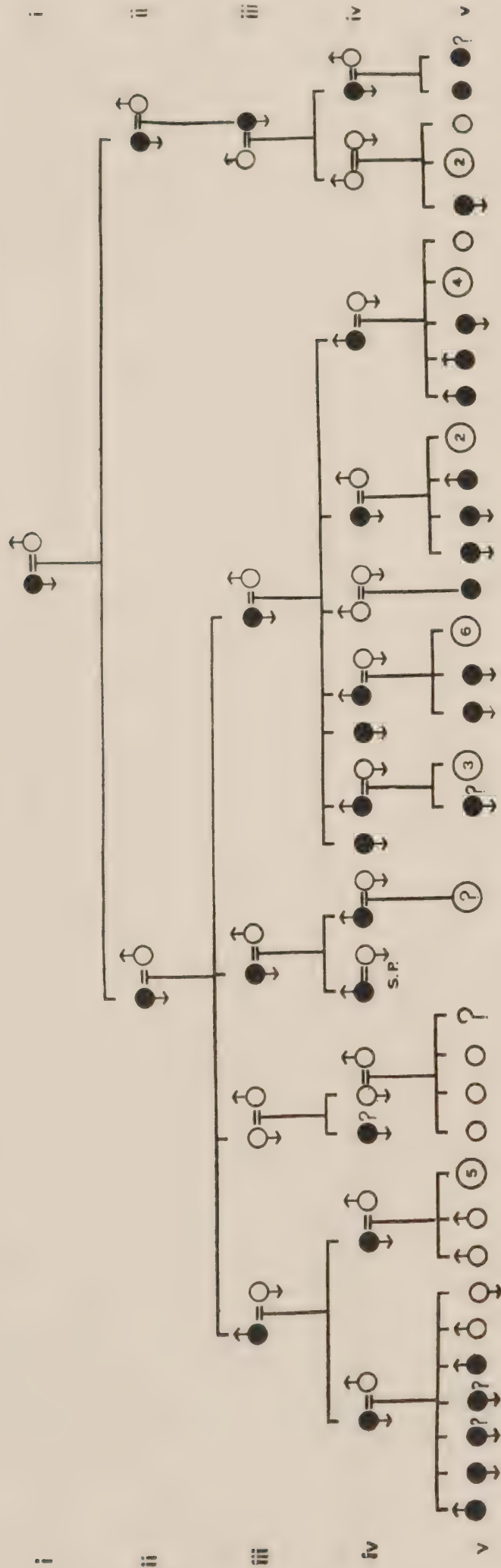


effective even in civilised communities. The remaining five are all mentally defective. Of these two are boys and three are girls. The eldest girl mates with one normal and two mentally defective men, and has ten children, of whom two die in infancy and all the remainder are mentally defective. The second mentally defective daughter has a child by her own father, which luckily dies in infancy. The third mates with a mentally defective man and up to the present has had three children, two mentally defective and one which died in infancy.

It is all very unpleasant; we are not our brothers' keepers and so we pass it by, regardless of the fact that at present we have to pay for the maintenance of such families in institutions, workhouses and prisons, and

CATARACT.

GJERSING'S CASE



that the nation ultimately pays far more in a general degeneration of the national stock. Take one more illustration. Here is a pedigree by Gjersing of Cataract (p. 21) which, if not wholly congenital, developed almost to blindness in the members of the stock by four to seven years of age. The children were operated on, many before ten years of age, but most regained only partial sight; they married and inflicted their ills on another generation of infants. In this case you have one affected woman who gives birth to two affected daughters, who in turn give rise to four affected granddaughters; these in turn produce twelve affected great-granddaughters, and these once again inflict eighteen great-great-granddaughters under this curse on the community. That one original taint has provided thirty-six tainted individuals and how many they may still give rise to it is too early yet to judge. We can say, however, that probably none of these individuals would have survived to maturity 25,000 or more years ago. A harsh cradle would have kept the race healthy.

The difficulty in giving expression to strong feeling about such cases is that the superficial listener draws the conclusion that you wish to out-herod Herod and kill off the afflicted individuals. That is the way they would cry you down, because you point out what Natural Selection has achieved in the past, and how its action is suspended in civilised communities, as a necessary condition of the growth of those communities. They do not like to be told that their morality is at fault; they fear you are bent on interfering with inexorable instincts and intimate personal matters. They will not realise that parentage is not identical with marriage, and that what is needed is a new morality as to parentage. In one way or another a nation has to protect its future members, otherwise that nation is destined to deterioration and death like the older empires. We cannot throw the burden of producing children, good, bad or indifferent, on our tribal god, when we know as much as we now do as to the making of children. To-day we can predict with much accuracy—not what the individual child will be but what the percentage of defect in a family of given ancestry will amount to. Let us pardon where ignorance is possible, but look at such pedigrees as those I have put before you, and no longer put the blame for them on your tribal god, rather than on your tribal custom, which fails to recognise the right of children to be well born.

I have heard two reasons given why mankind should not endeavour to check the flow of the maimed and halt into the world. The first has been recently stated with great force and with brilliant expression by Olive Schreiner in her posthumous novel *From Man to Man*. She held that mankind, by excluding as far as possible the deformed and

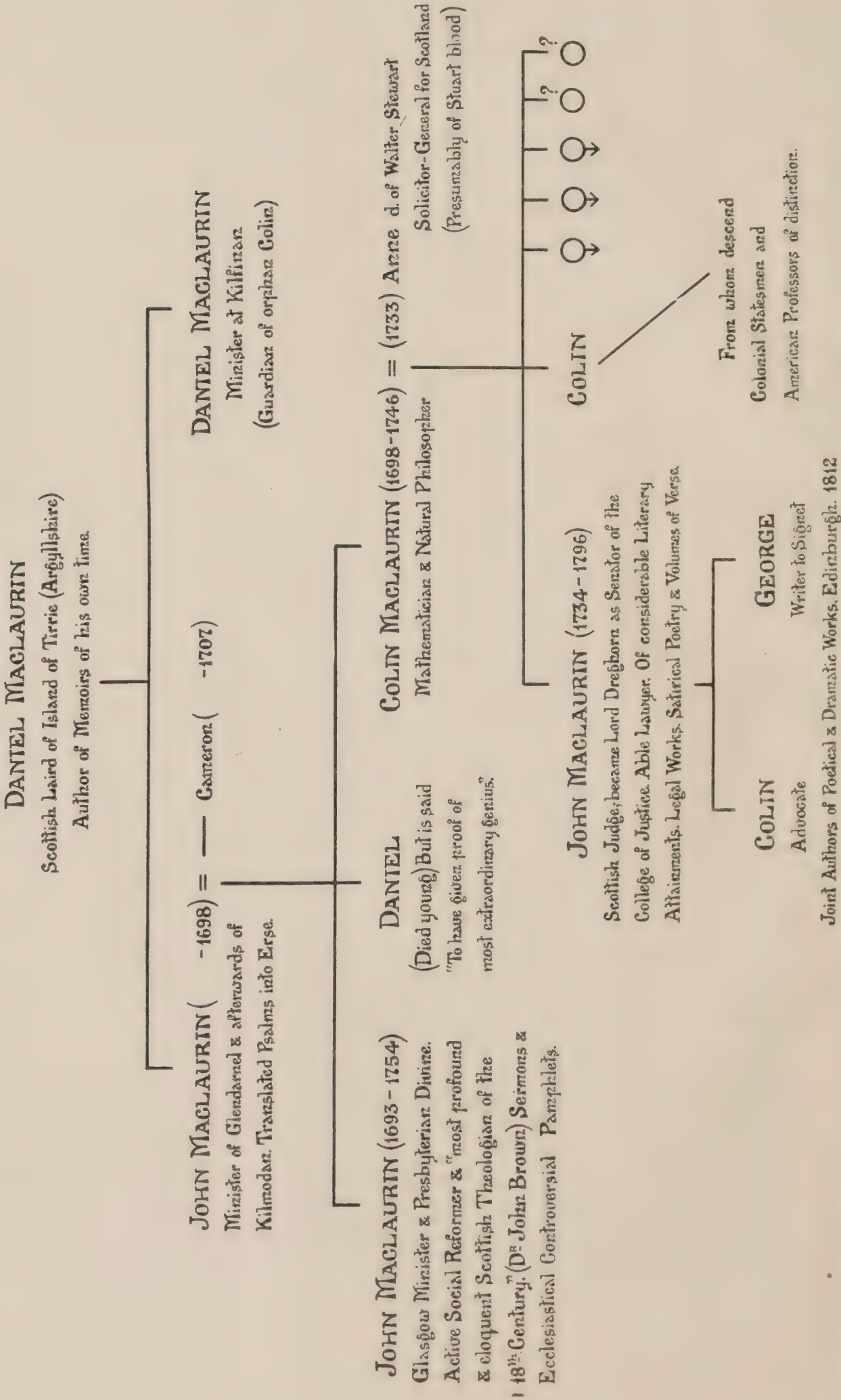
diseased from being born, would be lessening the material for exhibiting that human sympathy without which as cement human communities cannot exist. I venture to think she forgot how much suffering we shall always have with us, if we do not ourselves directly breed it. The very young and the very old will always be with us ; those also injured by accident and lamed by disease, those for whom life has proved too hard, and those who have failed through no gross fault of their own. The suffering in the world is too great without our creating defective children as food for our sympathetic instincts !

The second reason often stated for not checking the spread of mental or physical deformity is, we are told, that the great man, the genius, has often some gross mental or physical defect. I admit that certain men whom the world terms great have had such defects, but I deny the inference that physical inferiority is the source of genius. There has been no investigation worthy of the name demonstrating such a conclusion, and for every morbid genius you can name, it is easy to find two healthy great men to cap him. The three great men usually cited to emphasise this theory are Julius Caesar, Napoleon Buonaparte, and Lord Byron. The two former are asserted to have been epileptics and the latter a sexual pervert. To demonstrate that none of the three was a great man might prove a long and arduous task. We might, however, put a question which cuts to the root of the matter : We admit, let us say, that they were great men, but has humanity greatly profited by men of their type, and would they not possibly have achieved more for their species had they been less diseased, less morbidly self-centred ? I do not think the argument—that the world owes much to the diseased—will hold ; it owes more to the healthy, and what we need for the sake of humanity is more of the healthy mind in the healthy body. One epileptic genius is no fair return for thousands of mentally defective and epileptic children thrust on humanity because their parents have no social conscience.

What I have so far looked at is the negative side of practical Eugenics, the new *mos* which shall forbid the defective to breed their kind. I have left myself little time to touch on the positive side of Eugenics, the new *mos* which bids the strong in mind and body to breed their kind, and not to ruin their stirp by forming unfitting marriages or, when married, limiting parentage.

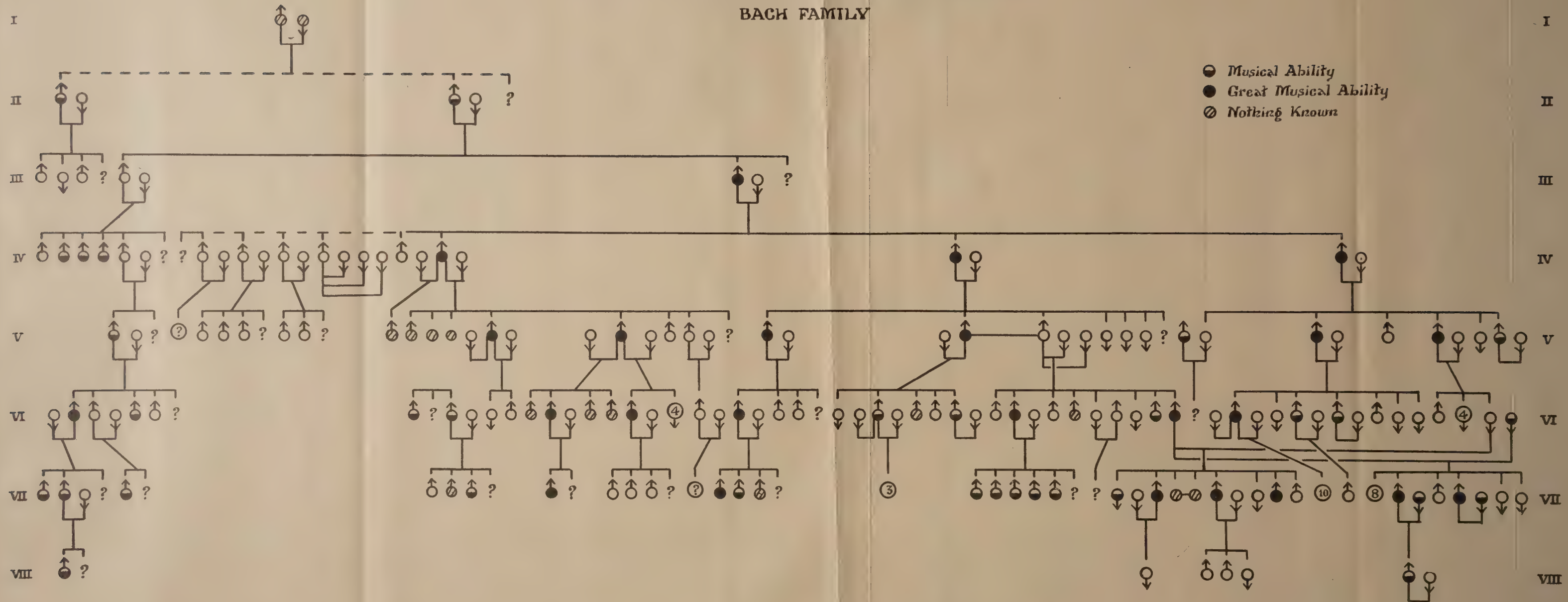
As the deaf-mute marries the deaf-mute, as the mentally deficient mates with her like, so there exist illustrious and able families who mating with their like, have produced, generation after generation, men of distinction. In five pedigrees, easily capable of multiplication, that I now

PEDIGREE OF THE DISTINGUISHED MEMBERS OF THE MACLAURIN FAMILY.



THE INHERITANCE OF MUSICAL ABILITY

BACH FAMILY



PEDIGREE OF THE BERNOULLIS. MERCHANTS, MAGISTRATES & MATHEMATICIANS.

JAMES, of Antwerp (? -1583) = Francina Cocx
Fled from religious persecution to
Frankfurt & was there the richest foreigner

NICHOLAS, of Frankfurt (1572-1615) = d. of Hans de Harloge
Merchant & grocer, most highly taxed man
in the city. of Antwerp

JAMES, of Basel (1598-1634) = Maria d. of
Jakob Frey, leading merchant
grocer of Basel

NICHOLAS (1623 - 1708) = Margaretha Schönauer
Chief Magistrate of Basel d. of the leading Banker Schönauer of Basel

JAMES I (1654-1705)
Distinguished Mathematician

NICHOLAS (1662-1717)
Painter & Magistrate of Basel

JOHN I (1667-1748) = d. of Basel Councillor Falkner
Celebrated Mathematician

HIERONYMUS (1669 - 1760) = Catharina Ebrieler
Wholesale Druggist and Drug Importer
Magistrate

JAMES
Painter & Magistrate

NICHOLAS I (1687-1759)
Mathematician, Jurist & Philosopher
Professor in Padua

NICHOLAS II (1695-1726)
Mathematician & Jurist of
St Petersburg Academy

DANIEL I (1700-1782)
Distinguished Mathematician &
Naturalist. St Petersburg

JOHN II (1710-1790) = d. of Emanuel König
Mathematician & Jurist
Prof. of Medicine in Basel

HIERONYMUS (1745 - 1829)
Merchant. President of Council. Founder of Natural History and
Mineralogy Collections in Basel. Benefactor of University.
Whence a long and widespread line of great Wholesale
Druggists of civic and mercantile distinction.

Veronika Beck = JOHN III (1744-1807)
d. of H.E.Beck. Merchant of Basel Astronomer & Mathematician
of Berlin

EMANUEL (1749-)

DANIEL II (1751-1834) =
Professor of Rhetoric
and of Medicine

JAMES II (1759-1789) = (1789) Charlotte d. of
Mathematician & Physicist Leonhard Euler the Mathematician
St Petersburg
(drowned two months after his marriage)

CHRISTOPHER (1782-1863)
Statistician, Mathematician & Naturalist

PEDIGREE OF ACADEMIC (MATHEMATICAL & MEDICAL) DISTINCTION

IV.

— ANDERSON

— ANDERSON

— ANDERSON

ALEXANDER ANDERSON 1582-1619
Prof. of Mathematics, University of Paris
Publications 1612-15

DANIEL ANDERSON OF FINYHAUGH
Mathematician & Inventor

JANET ANDERSON = REV. JOHN GREGORY 1598-1650
Minister of Drumoak

DAVID GREGORY OF KINNAIRDIE 1625-1720
Mathematician & Inventor

JAMES GREGORY F.R.S. 1638-75 = D. OF GEORGE JAMESON THE "SCOTTISH VANDYCK"
(1669)
Prof. of Mathematics, Edinburgh.
Of Telescope & Series Fame.
Correspondent of Collins & Newton

29 CHILDREN OF WHOM

DAVID GREGORY F.R.S. 1661-1708
Prof. of Mathematics, Edinburgh 1683-91
Savilian Prof. 1691-1708. Treatise on Practical Geometry
Edited by Colin Maclaurin.

JAMES GREGORY 1666-1742
Prof. of Mathematics, Edinburgh 1692-1728

CHARLES GREGORY 1681-1754
Prof. of Mathematics, St Andrews 1707-39

ISABEL = PATRICK INNES

MARGARET = LEWIS REID circa 1697
Minister of Strachan

JAMES GREGORY 1674-1733
THE ELDER
Prof. of Medicine, Aberdeen 1725-32

DAVID GREGORY 1712-65
Prof. of Mathematics, St Andrews 1739-63

JOHN INNES

THOMAS REID 1710-96
Mathematician, Physicist & Philosopher.
Prof. (or Regent) Aberdeen
Prof. of Philosophy, Glasgow 1764-96

JAMES GREGORY 1707-1755
THE YOUNGER
Prof. of Medicine, Aberdeen 1732-55

JOHN GREGORY F.R.S. 1724-73
Prof. of Medicine, Aberdeen 1756-66

ALEXANDER INNES 1716-42
Prof. of Philosophy, Aberdeen 1739-42

REV. WILLIAM GREGORY
On the Chapter, Canterbury
Cathedral

JAMES GREGORY 1735-1821
Prof. of Medicine, Edinburgh 1776-89

DOROTHEA = REV. ARCHIBALD ALISON

GEORGE GREGORY 1790-1853
Lecturer on Medicine St Thomas's Hospital
Author of many works on Medicine

WILLIAM GREGORY 1803-58
Prof. of Medicine, Aberdeen 1839-44
Prof. of Chemistry, Edinburgh 1844-58

DUNCAN FARQUHAIR GREGORY 1813-44
Mathematician, 5th Wrangler
Tutor of Trinity College, Cambridge
Author of Mathematical Books

WILLIAM PULTENEY ALISON 1790-1859.
Prof. of Medicine, 1820-55

PEDIGREE OF THE WALPOLES. (INHERITANCE OF EXECUTIVE ABILITY AND STATESCRAFT)

V.

SIR EDWARD WALPOLE M.P. = SUSAN D. of
Prominent in Restoration of Charles II.
(G.G. son of Edward Walpole & Lucy, sister
of Amy Robsart, Countess of Leicester.)
Sir Robert Crane of Chilton, Suffolk

ROBERT WALPOLE 1650-1700 = MARY D. of
of Houghston, Norfolk
A leading Whig Squire. M.P. for Castle Rising.
Sir Jeffrey Burnett of Rougham, Suffolk

SIR ROBERT WALPOLE M.P. 1676-1745 = CAROLINE SHORTER
Leader of Whigs. Favoured Religious Toleration. Secretary
of War. Premier. Leader of the House of Commons.
G.D. of Sir John Shorter,
Lord Mayor of London
Created Lord Orford

HORATIO WALPOLE 1678-1757 = MARY MAGDALEN D. of
Diplomatist & Politician
Created Baron Walpole
Peter (?) Lombard

DOROTHY = CHARLES
Second Viscount Townshend

MARY = SIR CHARLES TURNER
of Warham

ROBERT 2ND EARL ORFORD = MARGARET
- 1754
D. & Heiress of
Samuel Rolle of
Heanton, Devon

SIR EDWARD WALPOLE
Politician, Chief Secretary for
Ireland

HORACE WALPOLE 4TH EARL ORFORD
1717-1797
Famous Librarian, Connoisseur & Letter Writer. Died s.p.

HORATIO 2ND BARON WALPOLE = RACHEL, D. of
1723-
1ST EARL ORFORD (2ND Creation)
William, 3RD Duke of Devonshire

THOMAS WALPOLE M.P. = ELIZABETH D. of
1727-1803
Sir Joshua Van Neck

MARY TURNER = REV. MAURICE SUCKLING

GEORGE 3RD EARL ORFORD
Lord of Bedchamber
Died s.p.

Three illegitimate daughters, of whom,
MARIA married 1ST James second
Earl Waldegrave, 2ND H.R.H. William
Henry, Duke of Gloucester, brother of
George III.

HORATIO 2ND EARL ORFORD = SOPHIA D. of
1752-1822
Charles Churchill

THOMAS WALPOLE M.P. = MARGARET D. of
1755-1840
Minister at Munich
2ND Earl of Egmont

ROBERT WALPOLE 1756-
Clerk of Privy Council
Minister at Lisbon

GEORGE WALPOLE 1758-1835
Soldier, Politician.
Under Secretary for Foreign Affairs

MARY = MAURICE SUCKLING 1725-78
Controller of Navy. Spirited Action
against French 1757.

CATHERINE = REV. EDWARD NELSON

3RD, 4TH & 5TH EARLS
OF NO MARKED DISTINCTION

JOHN WALPOLE
Lieut. Colonel &
Chargé D'Affaires, Chili.

GEORGIANA MARY = REV. JOSEPH WOLFF
(Converted Jew)

SIR ROBERT WALPOLE 1808-76
Lieut. General. Soldier of distinction in Indian Army

RT. H^{ON} HORATIO SPENCER WALPOLE =
1806-98
Politician. Home Secretary

OF WHOM G.G.G. SON IS

SIR HENRY DRUMMOND WOLFF M.P.
Politician. One of the creators of the "3RD Party"
(Winston Churchill, Arthur Balfour & Drummond Wolff)

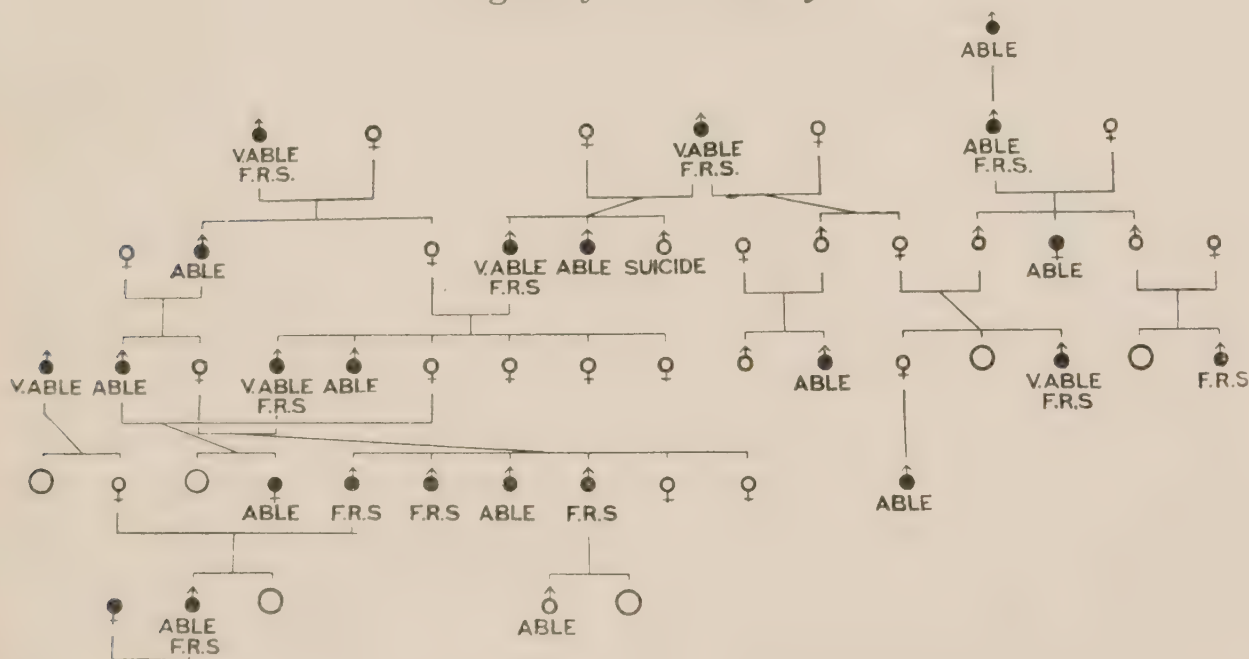
SIR SPENCER WALPOLE 1839-1907
Distinguished Civil Servant. Secretary to
Post Office & Writer of Political Biographies

SIR HORATIO GEORGE WALPOLE 1843
Distinguished Civil Servant.
Assistant Under Secretary of State for India.

HUGH SEYMOUR WALPOLE
1884 - C.B.E.
Distinguished Novelist

show you, you will find as many capable and able men as you find black circles in those pedigrees of disease. There is the great Bach family of illustrious musicians, extending through five generations (Pedigree II). There is the Bernoulli family, which for generations provided mathematicians for Europe and magistrates for Basel (Pedigree III). There is the Gregory family which provided for four generations professors for Scotland (Pedigree IV)*. Here again is a less well-known pedigree, which, starting with a country squire in 1650, one of the most active members of parliament of his day, i.e. Restoration of Charles II, has produced some of our greatest statesmen, distinguished diplomatists, able civil servants, and representatives of pure letters and political literature; many of you may

Pedigree of Able Family.



know the works of its latest representative, the brilliant novelist, Mr Hugh Walpole. But a greater than all these, our illustrious Admiral Horatio Nelson, undoubtedly inherited his ability from the Walpole blood of his grandmother (Pedigree V). Lastly, I would draw your attention to a singularly able scientific family. It has been blessed with the gift of mating wisely, even to the last generation. We have an anthropometric laboratory in this building where students are tested for their physique, their sense acuity, their intelligence and their physiological functioning. Some years ago we gave a prize to the woman student who had taken the highest rank in these combined tests. The lady who took that prize is now the wife

* A somewhat similar family is that of the Anderson-Maclaurins: see p. 24. Scotland again was for centuries ruled by four remarkable families, the Stewarts, the Hamiltons, the Douglasses and the Gordons, and when they were not occupied in murdering one another, they filled up their time with marrying each other. Both were alike recognitions of the ability of the rival stocks.

of the brilliant young man who has to carry on the traditions of this stock. We can hope the best as well as wish the best for that marriage.

But the old morality, that of to-day, is against the perpetuation and increase of the fit. We need a new tribal *mos* which will bid those of good stock,—and I use good stock in no narrow sense, it applies to the craftsman as well as the statesman—which will bid those of good stock to breed their like, and which will not only bid them but enable them to do it. I am sure that the endowment of motherhood is not an idle cry, but it must be not an indiscriminate dole but an endowment of fit parentage. What I would ask you to do is to think over these points: to consider whether your present tribal morality is a wholly good one. To ask yourselves whether you do not want new *mores*. Whether in the state of our present knowledge it is not immoral to bring diseased and afflicted children into the world? Whether this condemnation does not apply as much to the unaffected transmitter, as to the actually diseased parent? Whether these negative prohibitions ought not to be supplemented by a modification of the positive command of the old Jewish religion, which bade one and all increase and multiply, by limiting that command to those who are fitted for parentage? And then that clarion cry, which shall bind the past, the present and the future of the nation together—which indicates the truth the Romans embodied in their word for religion—that *religious* cry, I say, which shall form the basis of an extended morality—"The unborn have the right to be well-born." The acceptance of that *mos* is, to my mind, the sole condition that will suffice to save modern civilised nations, which perforce suspend the control of Natural Selection, from dying out, as the earlier civilisations without such a knowledge as ours of Nature's laws have invariably died out.



THE "LOBSTER CLAW" FAMILY S.



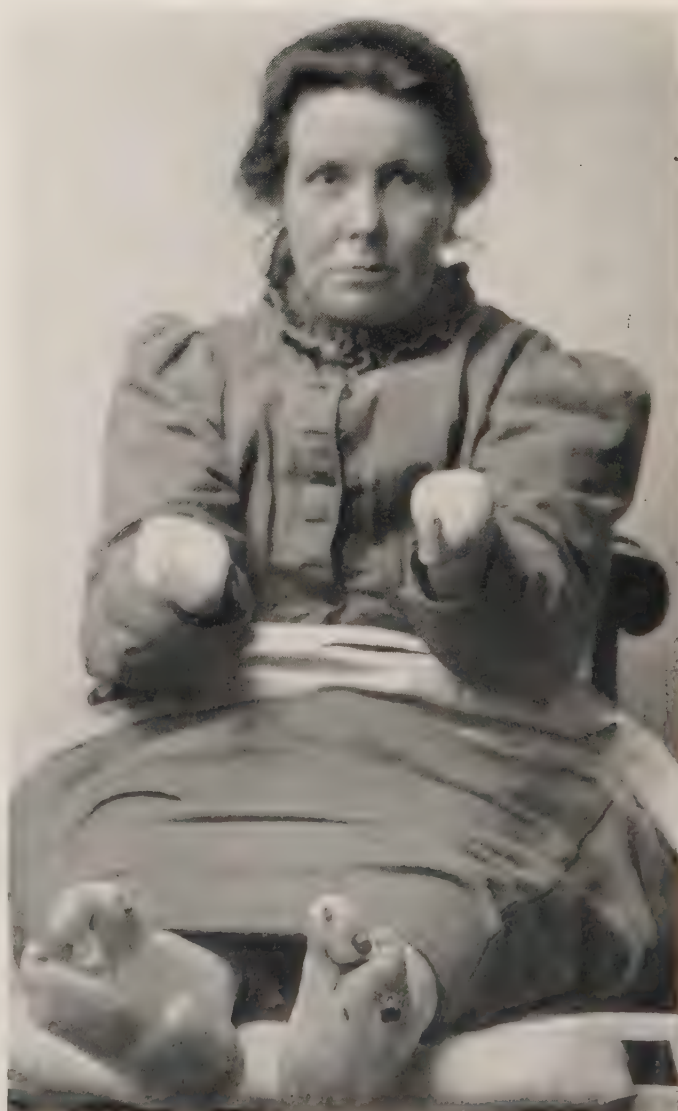
V. 7

IV. 3

V. 5



IV. 9



IV. 17

THE "LOBSTER CLAW" FAMILY S.



V. 31



V. 32



V. 21



V. 30

THE "LOBSTER CLAW" FAMILY S.



IV. 11



IV. 11



IV. 7



IV. 21



IV. 7



IV. 9

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